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10/587,533	07/26/2006	Alexey Vitalievich Ryzhykh	42P24165	9662

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12400 Wilshire Boulevard
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Los Angeles, CA 90025

EXAMINER

NICKERSON, JEFFREY L

ART UNIT	PAPER NUMBER
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2442

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09/01/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/587,533

Applicant(s)

RYZHYKH, ALEXEY VITALIEVICH

Examiner

JEFFREY NICKERSON

Art Unit

2442

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 May 2010.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 and 17-21 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-15 and 17-21 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/GS/US)
4) ☐ Interview Summary (PTO-413)
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____
Paper No(s)/Mail Date _____

DETAILED ACTION

1. This communication is in response to Application No. 10/587,533 filed nationally on 26 July 2006 and internationally on 31 May 2006. The response presented on 17 May 2010, which amends claim 1, and presents arguments, is hereby acknowledged. Claims 1-15 and 17-21 have been examined.

Claim Objections

2. Applicant's response, presented on 17 May 2010 and providing change to claim 1, is noted. All outstanding objections to the claims are hereby withdrawn.

35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Response to Arguments

4. Applicant's arguments, filed in the response dated 17 May 2010 and with respect to the rejections under 35 USC 103(a), have been fully considered but are found unpersuasive.

Independent claim 1, 8, 11 and 15

Applicant argues the combined teachings fail to render obvious one or more limitations within these claims. Specifically, applicant argues the combined teachings fail to render obvious the following:

“determining that a pre-registered RDMA buffer of the plurality, which has been pre-registered for a given connection, has insufficient size to transfer data”;

“sending a control message indicating that a first larger RDMA buffer is to be provision for the given connection and that a receiving node is to provision a larger RDMA buffer;” or

“receiving an acknowledgment messages from a network corresponding to the control message, the acknowledgment message including information associated with communication with the larger RDMA buffer of the receiving node.”

Applicant's arguments are based on the premise that Eydelman does not determine the receiver buffer has insufficient size, and argues that the references individually do not teach various excerpts of the above-argued limitations.

The examiner respectfully disagrees. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Notwithstanding, sending control messages and receiving acknowledgements for connection parameter customization in an RDMA

environment are known (See Culley, pg 31-37 regarding "private data"). Eydelman discloses using control messages to request a receiver increase their buffer size when a sender identifies that the receive buffer size is too small (Eydelman: [0041]). Eydelman uses an algorithm based on fragmentation frequency for making the determination on whether the receive buffer is too small and needs to be increased in size. This algorithm does not preclude Eydelman for not rendering aspects of the claimed invention non-obvious. Furthermore, Eydelman does, in fact, teach determining that the receive buffer has "insufficient size". Applicant's claim does not explicitly define what is considered to be an "insufficient size", and thus the examiner must give the phrase its broadest reasonable interpretation. As such, the examiner maintains that Eydelman's determination deems the receiver buffer as having "insufficient size" because it determines the receiver buffer is not adequate for the purpose (the purpose being efficient communication in this case). Creemer and Lee disclose the missing limitations regarding pre-registering the buffer. Thus, the examiner maintains the above-argued limitation is rendered obvious by the combined teachings.

Applicant's arguments are ultimately unpersuasive and, therefore, the rejections of these claims are hereby maintained.

Dependent claims 2-7, 9-10, 12-14, and 17-21

Applicant argues these claims conditionally based on arguments presented for their parent claim(s).

Applicant's arguments are ultimately unpersuasive and, therefore, the rejections of these claims are hereby maintained.

Claim Rejections

5. Claims 1-15, 17-19, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Creemer (US 6,014,727); and in further view of Lee (US 2006/0227799 A1), Culley et al ("Marker PDU Aligned Framing for TCP Specification", 27 September 2005), and Eydelman et al (US 2005/0235059 A1).

Regarding claim 1, Creemer teaches a method comprising:

pre-allocating each of a plurality of buffers to a different connection of a plurality of connections (Creemer: abstract; Figures 2-3; col 2, lines 1-20);

determining that an allocated buffer of the plurality, which has been allocated for a given connection, has insufficient size to transfer data (Creemer: Figure 3; col 2, lines 29-60; col 5, lines 35-52; col 6, lines 43-51);

provisioning and allocating a larger buffer for the given connection, wherein the larger buffer is not provisioned and allocated for another connection of the plurality, and wherein a size of the larger buffer is larger than a size of the pre-allocated buffer (Creemer: Figures 2-4; col 2, lines 29-60; col 5, lines 35-52; col 6, lines 43-51).

Creemer does not teach wherein the buffer is a pre-registered RDMA buffer; transferring the data to a network using the buffer;

sending a control message indicating a first larger RDMA buffer is to be provisioned for the given connection and that a receiving node is to provision a larger RDMA buffer;

receiving an acknowledgement message from a network corresponding to the control message, the acknowledgement message including information associated with communication with the larger RDMA buffer of the receiving node.

Lee, in a similar field of endeavor, teaches wherein the buffer is a pre-registered RDMA buffer (Lee: [0003]) and wherein buffers are RDMA buffers (Lee: [0003]); and transferring the data to a network using the buffer (Lee: [0003]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the teachings of Lee for using an RDMA system. The teachings of Lee, when implemented with the Creemer system, will allow one of ordinary skill in the art to adjust buffer sizes as needed, in an RDMA environment. One of ordinary skill in the art would be motivated to utilize the teachings of Lee with the Creemer system in order to apply the buffer technique to commonly used networking environments.

The Creemer/Lee system does not teach sending a control message indicating a first buffer is to be provisioned for the given connection and that a receiving node is to provision a larger buffer;

receiving an acknowledgement message from a network corresponding to the control message, the acknowledgement message including information associated with communication with the larger buffer of the receiving node.

Culley, in a similar field of endeavor, teaches sending a control message with commands about an RDMA connection (Culley: pg 31-35, see "Startup Phase", provides exchanging private data for connection setup; Specifically the MPA Request; See also pg 34, section 6.1.2; See pg 37 #6 for description of "private data"); and

receiving an acknowledgement from the network corresponding to the control message, the acknowledgment message including information associated with the communication of the receiving node (Culley: pg 31-34, specifically the MPA Reply; See also pg 34-35 section 6.1.2 step 2 provides for replying with private data; See pg 37 #6 for description of "private data").

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the teachings of Culley for using an control handshaking for setting up connection parameters. The teachings of Culley, when implemented with the Creemer/Lee system, will allow one of ordinary skill in the art to handshake control information to adjust connection parameters in an RDMA environment. One of ordinary skill in the art would be motivated to utilize the teachings of Culley with the Creemer/Lee system in order to allow the initiator/target to dynamically customize connection parameters based on their needs.

The Creemer/Lee/Culley system does not teach wherein the control message is indicating a first buffer is to be provisioned for the given connection and that a receiving node is to provision a larger buffer; or

wherein the communication is with the larger buffer.

Eydelman, in a similar field of endeavor, teaches wherein the control message is indicating a first buffer is to be provisioned for the given connection and that a receiving node is to provision a larger buffer (Eydelman: [0041]);

receiving an acknowledgement message from a network corresponding to the control message, the acknowledgement message including information associated with communication with the larger buffer of the receiving node (Eydelman: [0041]); and

determining the receiver buffer has insufficient size to transfer data (Eydelman: [0041] provides for determining the receiver buffer is inadequate).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the teachings of Eydelman for allowing to sender to instruct the receiver to increase its buffer size and have a corresponding acknowledgement. The teachings of Eydelman, when implemented with the Creemer/Lee/Culley system, will allow one of ordinary skill in the art to handshake buffer size adjustment instructions in an RDMA environment. One of ordinary skill in the art would be motivated to utilize the teachings of Eydelman with the Creemer/Lee/Culley system in order to allow the initiator/target to dynamically instruct the adjustment of buffer sizes based on their needs.

Regarding claim 2, the Creemer/Lee/Culley/Eydelman system teaches prior to said transferring, receiving the acknowledgement message indicating that the receiving node has provisioned the larger RDMA buffer, wherein the information includes an address of the larger RDMA buffer of the receiving node and a remote key (Eydelman: [0041] for

returning newly provisioned buffer information; Lee: [0021] for address; Culley: pg 33, Key field for key).

Regarding claim 3, the Creemer/Lee/Culley/Eydelman system teaches wherein said determining comprises comparing a size of the data to a predetermined threshold (Creemer: col 7, lines 17-24).

Regarding claim 4, the Creemer/Lee/Culley/Eydelman system teaches further comprising comparing sizes of a plurality of elements of an input-output vector (incoming packet stream) to the predetermined threshold (Creemer: col 7, lines 17-24 provides that the data stream for that specific connection is compared to the buffer threshold size for the small buffer; Lee: Figure 5A for outgoing buffer queue).

Regarding claim 5, the Creemer/Lee/Culley/Eydelman system teaches wherein said provisioning comprises allocating and registering the first larger RDMA buffer during a communication phase (Creemer: col 6, lines 30-42 for larger buffer; Lee: [0003]-[0004] for allocating and registering during communication).

Regarding claim 6, the Creemer/Lee/Culley/Eydelman system teaches further comprising:

unregistering the pre-registered RDMA buffer (Lee: [0025]); and

freeing memory used by the pre-registered RDMA buffer (Lee: [0025]).

Regarding claim 7, the Creemer/Lee/Culley/Eydelman system teaches wherein said transferring comprises:

copying data from a source to the first larger RDMA buffer (Lee: Figure 5A, [0036], [0083]-[0086]); and

performing an RDMA transfer from the larger RDMA buffer to the network (Lee: Figure 5A; [0085]-[0087]).

Regarding claim 8, this article of manufacture claim contains limitations found within claims 1, 3, and 5, and the same rationale of rejection is used, where applicable.

Regarding claim 9, this article of manufacture claim contains limitations found within claim 2, and the same rationale of rejection is used, where applicable.

Regarding claim 10, this article of manufacture claim contains limitations found within in claim 7, and the same rationale of rejection is used, where applicable.

Regarding claim 11, this system claim contains limitations found within that of claim 1 and the same rationale of rejection is used, where applicable; and further comprising:

an interconnect (Creemer: Figure 1);

one or more processors coupled with the interconnect (Creemer: Figure 1; Figure 6; col 9, lines 31-60);

a memory coupled with the interconnect to store data (Creemer: col 5, lines 52-67);

a network interface device coupled with the interconnect to transfer data to a network by using an Ethernet protocol (Creemer: Figure 6, item 812; col 10, lines 1-8; Eydelman: [0003] provides for Ethernet use).

Regarding claim 12, this system claim contains limitations found within that of claims 1 and 2, and the same rationale of rejection is used, where applicable.

Regarding claim 13, this system claim contains limitations found within claims 3, 5, and 7, and the same rationale of rejection is used, where applicable.

Regarding claim 14, the Creemer/Lee/Culley/Eydelman system teaches wherein the pre-registered RDMA buffer has a size ranging from 100 to 2000 bytes (Creemer: col 9, lines 9-17); and

wherein the provisioned RDMA buffer has a size ranging from 1000 to 200,000 bytes (Creemer: col 9, lines 18-30).

Regarding claim 15, this method claim contains limitations found within that of claims 1 and 2, and the same rationale of rejection is used, where applicable.

Regarding claim 17, this method claim contains limitations found within that of claim 5, and the same rationale of rejection is used, where applicable.

Regarding claim 18, this method claim contains limitations found within that of claim 6, and the same rationale of rejection is used, where applicable.

Regarding claim 19, this method claim contains limitations found within that of claim 7, and the same rationale of rejection is used, where applicable.

Regarding claim 21, this method claim contains limitations found within that of claim 2, and the same rationale of rejection is used, where applicable.

6. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Creemer (US 6,014,727); in view of Lee (US 2006/0227799 A1), Culley et al ("Marker PDU Aligned Framing for TCP Specification", 27 September 2005), and Eydelman et al (US 2005/0235059 A1); and in further view of Kahle et al (US 6,725,354 B1).

Regarding claim 20, this method claim contains limitations found within claim 11, and the same rationale of rejection is used, where applicable.

The Creemer/Lee/Culley/Eydelman system fails to teach a processor having multiple cores.

Kahle, in a similar field of endeavor, teaches a processor having multiple cores (Kahle: abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the teachings of Kahle for having multi-core processors. The teachings of Kahle, when implemented with the Creemer/Lee/Culley/Eydelman system, will allow one of ordinary skill in the art to use multi-core processors in a dynamic buffer adjusting RDMA environment. One of ordinary skill in the art would be motivated to utilize the teachings of Kahle with the Creemer/Lee/Culley/Eydelman system in order to increase overall processing capabilities.

Citation of Pertinent Prior Art

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. Eydelman et al (US 7,707,589 B2) discloses content similar to that of the cited.
- b. Simpson III (US 6,542,941 B1) discloses an RDMA system that identifies when a transfer block will overflow a receiver buffer.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JEFFREY NICKERSON whose telephone number is (571)270-3631. The examiner can normally be reached on M-Th, 9:00am - 7:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Asad Nawaz can be reached on (571)272-3988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. N./
Examiner, Art Unit 2442

/Asad M Nawaz/
Supervisory Patent Examiner, Art Unit 2442